Kissing as a protective factor against decreased salivary pH. A randomized controlled trial

Fernando Marcelo Briones Sr, Andrea Bermúdez Velásquez Sr, Mariuxi Aguila Gaibor

Submitted to: JMIR Research Protocols
on: August 09, 2024

Table of Contents

Kissing as a protective factor against decreased salivary pH. A randomized controlled trial

Fernando Marcelo Briones Sr[1*] PhD; Andrea Bermúdez Velásquez Sr[1*] ESP; Mariuxi Aguila Gaibor[1*]

[1]Dental school Universidad Católica de Santiago de Guayaquil Guayaquil EC
[*]these authors contributed equally

Corresponding Author:
Fernando Marcelo Briones Sr PhD
Dental school
Universidad Católica de Santiago de Guayaquil
Av. Carlos Julio Arosemena Km 1 ½
Guayaquil
EC

Abstract

Background: Kissing is a common social behavior that may influence physiological responses and impact oral health. Prior research has shown that affectionate behaviors like kissing can reduce stress and improve relationship satisfaction. However, the effects of kissing on salivary pH, particularly after consuming sugary or fermented drinks, have not been thoroughly investigated. This study aims to explore whether kissing can neutralize the acidic pH of saliva caused by such beverages.

Objective: To determine the effect of kissing on salivary pH following the consumption of sugary or fermented drinks.

Methods: A randomized controlled trial (RCT) was conducted with 60 couples aged 18-30. Participants were divided into three groups: a control group (no kissing), an experimental group where one partner consumed a drink, and another experimental group where both partners consumed a drink. The study measured salivary pH at baseline, after drink consumption, and following a 40-second kiss or a control period, with measurements taken every 5 minutes until pH returned to neutral levels. Data were analyzed using SPSS software, employing t-tests, ANOVA, and other relevant statistical methods.

Results: The study is ongoing, with preliminary data expected in November 2024. Initial recruitment indicates sufficient interest from the target population.

Conclusions: This study will provide insights into the relationship between kissing, salivary pH, and oral health, potentially offering new strategies for dental caries prevention. The results may challenge existing assumptions about the role of kissing in maintaining oral hygiene. Further research will be needed to confirm these findings. Clinical Trial: ClinicalTrials.gov NCT06501729

(JMIR Preprints 09/08/2024:65253)
DOI: https://doi.org/10.2196/preprints.65253

Preprint Settings

1) Would you like to publish your submitted manuscript as preprint?

✓ **Please make my preprint PDF available to anyone at any time (recommended).**
Please make my preprint PDF available only to logged-in users; I understand that my title and abstract will remain visible to all users.
Only make the preprint title and abstract visible.
No, I do not wish to publish my submitted manuscript as a preprint.

2) If accepted for publication in a JMIR journal, would you like the PDF to be visible to the public?

✓ **Yes, please make my accepted manuscript PDF available to anyone at any time (Recommended).**
Yes, but please make my accepted manuscript PDF available only to logged-in users; I understand that the title and abstract will remain v
Yes, but only make the title and abstract visible (see Important note, above). I understand that if I later pay to participate in <a href="http

Original Manuscript

Proposal

Fernando Marcelo Armijos Briones
Research project director
fernandoarmijos@cu.edu.ec

Andrea Bermúdez Velásquez
Associate researcher
andrea.bermudez@cu.ucsg.edu.ec

Mariuxi Aguila Gaibor
Research assistant
mariuxi.aguila@cu.ucsg.edu.ec

Dental School, Universidad Católica de Santiago de Guayaquil. Guayaquil, Ecuador

Kissing as a protective factor against decreased salivary pH. A randomized clinical trial.

Abstract

Background: Kissing is a common social behavior that may influence physiological responses and impact oral health. Prior research has shown that affectionate behaviors like kissing can reduce stress and improve relationship satisfaction. However, the effects of kissing on salivary pH, particularly after consuming sugary or fermented drinks, have not been thoroughly investigated. This study aims to explore whether kissing can neutralize the acidic pH of saliva caused by such beverages.
Objective: To determine the effect of kissing on salivary pH following the consumption of sugary or fermented drinks.
Methods: A randomized controlled trial (RCT) was conducted with 60 couples aged 18-30. Participants were divided into three groups: a control group (no kissing), an experimental group where one partner consumed a drink, and another experimental group where both partners consumed a drink. The study measured salivary pH at baseline, after drink consumption, and following a 40-second kiss or a control period, with measurements taken every 5 minutes until pH returned to neutral levels. Data were analyzed using SPSS software, employing t-tests, ANOVA, and other relevant statistical methods.
Results: The study is ongoing, with preliminary data expected in November 2024. Initial recruitment indicates sufficient interest from the target population.
Conclusions: This study will provide insights into the relationship between kissing, salivary pH, and oral health, potentially offering new strategies for dental caries prevention. The results may challenge existing assumptions about the role of kissing in maintaining oral hygiene. Further research will be needed to confirm these findings.
Trial Registration: ClinicalTrials.gov NCT06501729

Keywords: Saliva; Oral health; Sugar-Sweetened Beverages; Dental caries prevention

Introduction

Background:

Kissing is a common social behavior that has been extensively studied in various contexts, including its effects on physiological responses (1). Many researchers have examined the role of kissing in the transmission of infectious diseases, particularly in the context of romantic relationships (2).
Understanding the effects of kissing on physiological responses can provide insight into the role of social behaviors in health and well-being. To further explore kissing and its impact on physiological responses, more research is needed to understand the underlying mechanisms and potential long-term effects on overall health and well-being.
Previous research indicates that romantic kissing can have an impact on physiological parameters such as heart rate, blood pressure, and cortisol levels (3), and increased frequency of romantic kissing in adults leads to improvements in perceived stress and relationship satisfaction, along with a reduction in total serum cholesterol, suggesting a stress-ameliorating effect of affectionate behavior. However, this study did not directly measure changes in cortisol levels or blood pressure as a result of kissing. Moore et al. (2017)(4), while focusing on the motives for romantic kissing, does not provide data on the physiological effects of kissing, such as changes in heart rate, blood pressure, or cortisol levels. In contrast, other studies have examined the relationship between stress and physiological markers such as cortisol levels and blood pressure. Hundekari et al. (2022) (5), for example, found that health care workers in direct contact with COVID-19 patients showed elevated stress scores strongly correlated with serum cortisol levels and blood pressure. This suggests that stress, which could potentially be alleviated by affectionate behaviors, such as kissing, is associated with physiological changes. In summary, while the research provided does not directly link the act of kissing with changes in cortisol levels and blood pressure, it suggests that affectionate behaviors can lead to improvements in psychological stress and may indirectly influence physiological stress markers. However, there is limited research on the effects of kissing on salivary pH.
The current study aimed to fill the knowledge gap regarding the effects of kissing on salivary pH, specifically after the consumption of sugary or fermented drinks. The research question for this study was: Does kissing between two people increase salivary pH after it has decreased due to the consumption of sugary or fermented drinks?

Objective:

This study aimed to determine the effects of kissing on salivary pH in the context of consumption of sugary or fermented drinks.

Hypothesis:

It is hypothesized that kissing between two people will increase salivary pH after it decreases due to the consumption of sugary or fermented drinks.

Methods

Overview

This study was reviewed and approved by the Council on Ethics in Human Research from the Instituto Superior Tecnológico de “Portoviejo” CEISH-ITSUP (681428096) and was registered in the Clinical Trials Registry (NCT06501729).

Study Design

The protocol will be carried out using a parallel three-arm randomized controlled design. It will be evaluated whether the act of kissing on the mouth between two people can cause the pH of saliva to increase after consuming sugary or fermented drinks. The initial pH will be obtained from participants who meet the inclusion criteria. After recording the initial pH, you will be given 200 ml of one of the drinks was selected for the study (Coca-Cola, artificial fruit juice, and non-alcoholic beer). After ingesting the drink, the participants were asked to drool into a test tube to measure the pH of the saliva using a pH meter. Based on the literature, it is expected that the pH will decrease. After this measurement, the experimental groups will be asked to kiss their partners, and the control group will not do so. The pH of the saliva was measured for a third time 5 min after ingesting the

drink to record its increase. This will be done repeatedly, every 5 minutes, until the pH of the saliva reaches a neutral level (6.8 - 7.2).
The difference between the experimental groups is that, in one, only one person from the kissing couple will drink a sugary or fermented drink, and in the other group, both people will drink the sugary or fermented drink. Each week, a different drink will be tested; that is, in week one, it will be tested with Coca Cola, in week two with artificial fruit juice, and in week three, with non-alcoholic beer.
This RCT will be conducted according to the checklist and guidelines of the Consolidated Standards of Reporting Trials (6). Figure 1 shows the group assignment design.

Eligibility Criteria
Some physiological and pathological conditions could alter the pH of saliva, which could bias the results of this study. Therefore, the aim is to select couples between 18 and 30 years old, the age at which the probability of having chronic degenerative diseases is lower. In addition, all volunteers who enroll will undergo an oral examination to determine their oral health and exclude those who have abscesses, extensive carious cavities (level 5 or 6 according to IICDAS), periodontal disease, and other alterations that may modify the salivary pH. Furthermore, they must not undergo medical treatment that requires them to consume medications that change the pH of their saliva.

pH saliva
The pH of body fluids is a measure of the hydrogen ion (H+) concentration within them, reflecting their acidity or alkalinity. The normal pH range for extracellular fluid (ECF) is tightly regulated between 7.35 and 7. The pH of (ICF) is slightly lower, ranging from 7.1 to 7.2. It is essential to maintain these pH levels within narrow limits to ensure proper enzymatic and metabolic processes (7). Interestingly, despite the vast difference in concentration between H+ and other ions, such as Na+, the body's regulatory mechanisms are adept at maintaining the pH within the necessary range for life, which is between 6.8 and 7.8 ECF. Any deviation from the normal pH range can lead to significant physiological disturbances because pH influences the structure and function of proteins and affects various physiological processes. In summary, the pH of body fluids is a critical physiological parameter that can be maintained within a narrow range. The normal pH for ECF is between 7.35 and 7.45, and for ICF, it is between 7.1 and 7.2. The body employs various mechanisms to regulate this balance, ensuring optimal functioning of cellular and systemic processes(8).

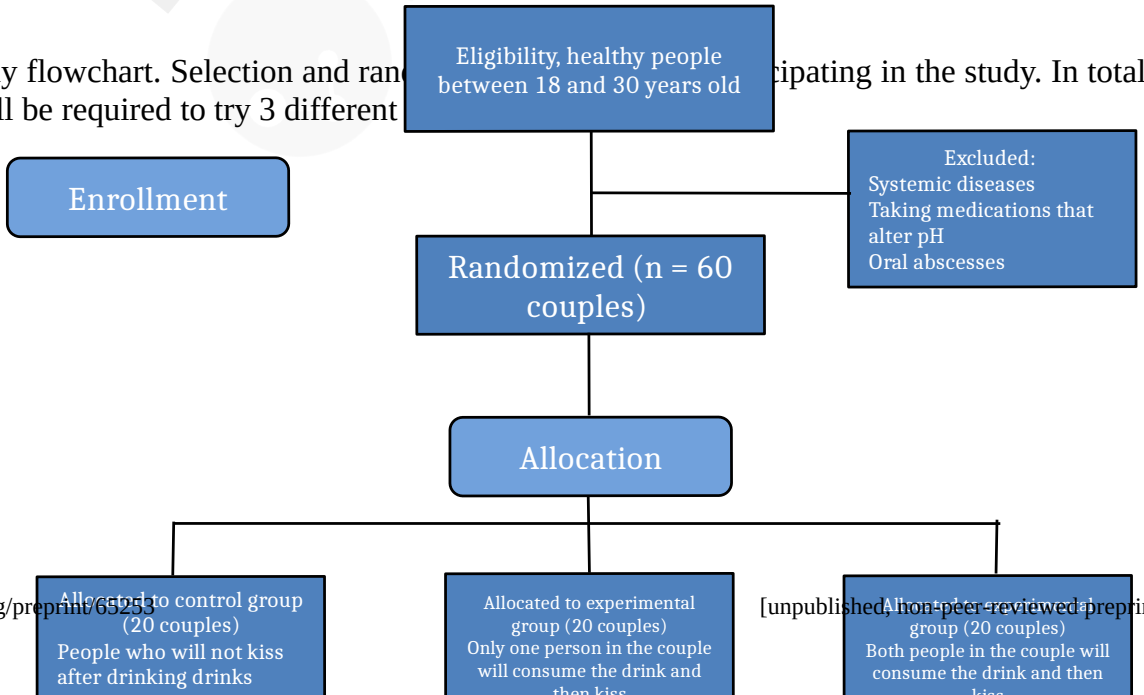
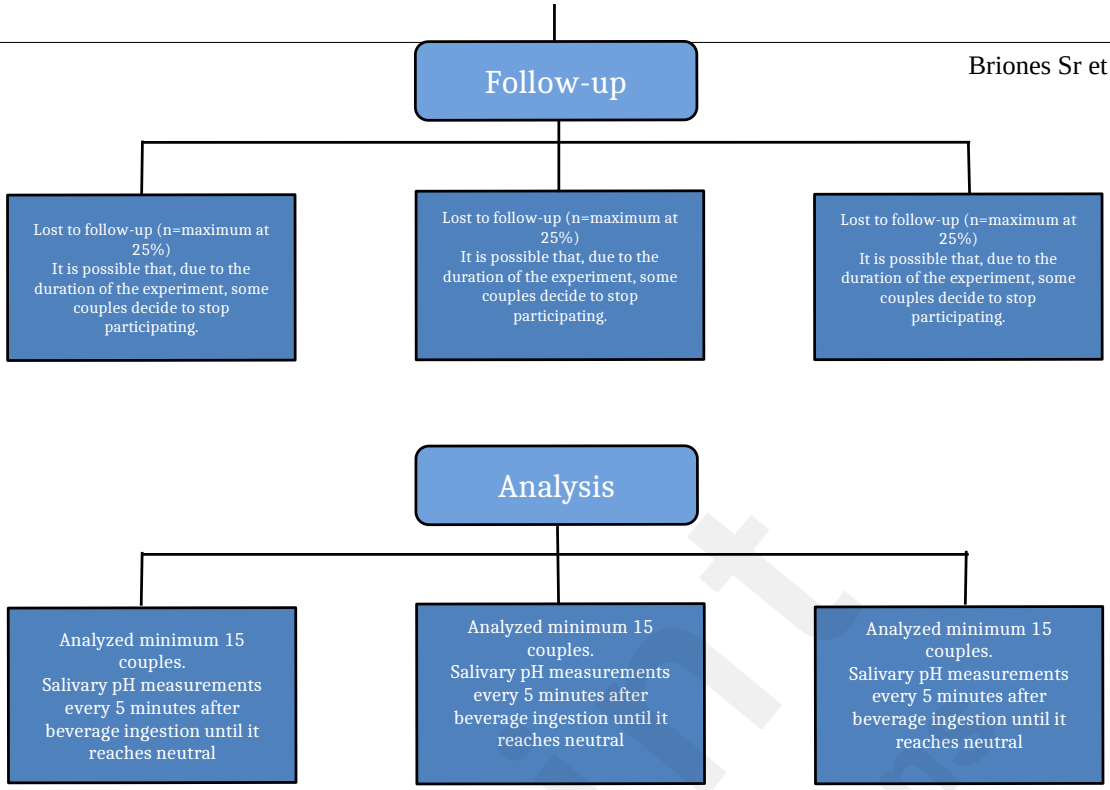


Figure 1. Study flowchart. Selection and ran cipating in the study. In total, 45 couples will be required to try 3 different



A pH meter measures the hydrogen ion activity in a solution, which is indicative of its acidity or basicity. The device typically employs a glass electrode as a pH sensor, which interacts with hydrogen ions in the solution to produce an electrical potential that can be translated into a pH value. This value is displayed on a readout, often an LCD, which may also show temperature readings owing to the influence of temperature on pH measurements.

The saliva sample for pH measurement will not be stimulated because the increase in fluid alters the pH; thus, a reduced sample is expected to be obtained. For this reason, a thin electrode was used so that it could enter the bottom of the test tube and capture the measurement. For this purpose, the Toledo brand electrode was chosen based on the following technical characteristics:

Micro combined pH electrode with glass body and S7 threaded head
Measuring range: pH 0 - 14
Temperature zone: 0°C - 80°C
Union type: Ceramic
Shaft material: Glass
Sensor type: Combined electrode
Shaft length: 60mm
Shaft diameter: 3mm

Reference system: ARGENTHAL with Ag+ ion trap
Reference electrolyte: 3 mol/l KCl Glass membrane: U
Membrane resistance (25C): <600M

Randomization

Randomization will be carried out by an external researcher to whom lists of coded pairs will be given. The researcher will use the randomized website to create three lists, one for each group. In this way, each couple will be assigned to three different groups: control, experimental 1, and experimental 2. None of the participants will know which group they will belong to until the day of the test, because knowing this could stimulate the salivary glands and generate a greater amount of saliva.

Sample Size

To select the participating couples, a call will be made among the students of the Universidad Católica Santiago de Guayaquil and the general public in the established age range. To participate in the study, participants must agree, together with their partner, to be part of the research and sign the informed consent form. The couples will be divided into two groups: an experimental group that will kiss with its partner, and a control group that will not. However, both groups must be registered with their partners. This is because the participants will not know which group they will be assigned to until the day of saliva sample collection. The gender of the participants will be equal between the groups, that is, half men and half women. Additionally, all participants must meet the inclusion criteria for this study detailed in the specific section in this document.

To select the minimum sample to be studied, the pilot study “Comparison of Salivary pH Changes after Consumption of Two Sweetened Malaysian Local Drinks among Individuals with Low Caries Experience: A Pilot Study” carried out by (14) will be taken as a reference. In this study, the data necessary to perform a sample calculation using means are provided. For this method, it is necessary to have the mean and standard deviation of studies that have measured the phenomenon in a similar way to the one intended. This assumption is met because in the reference study, salivary pH was measured after drinking drinks several times. In addition, they used salivary samples placed in a test tube and pH meter similar to that used in this study. Table 4 on page 7 of the published article was used as reference. Specifically, the mean value of the pH and the Standard Deviation at 10 minutes after consuming the drink, of the control group (mineral water) and of the local drink that showed the most variation, 7.10 (0.18) and 6.86 (0.18). ,18) respectively. These values were chosen because they were recorded when there was the greatest variation between the pH values.

The sample calculation was performed using the G*Power statistical program version 3.1.9.6 (Fran Faul, Universität Kiel, Germany). The data of the means between groups and standard deviation obtained in the aforementioned pilot study of: 7.10 (0.18) for the control group and 6.86 (0.18) for the experimental group were entered into the program (in the native drink tested on the participants). Figure 1 shows an α of 0.01 was used by requiring several measurements in the groups and a confidence level of 95% (β). The power obtained with the sample calculation was 0.96, and the test chosen to perform a posteriori was the t-test because it is useful for comparing the means of two groups, as is the objective of the study. For greater details of the sampling process, the results of the statistical program are detailed below.

Intervention

The act of kissing will be an intervention that we try to associate with an increase in salivary pH after its decrease. To do so, the experimental groups will kiss with their partner after ingesting one of the drinks that will be tested in the following way: first, the baseline pH of the participants' unstimulated saliva will be taken, and then they will be given 300 ml the drink to be tested in the week. After verifying that it was completely ingested by the participants, they will wait one minute to ask for a new saliva sample and verify the decrease in pH. After recording the second measurement, the participants in the experimental group will be asked to kiss with their partner for 40 seconds. Participants will be instructed to make this kiss "passionate." After that time, you will wait 4:20

minutes (remaining time to complete 5 min), and a saliva sample will be taken again to record the pH. Except for the act of kissing, the same will be done with the control group, with a saliva sample taken every 5 min for the next 40 min, which is when physiological reestablishment of salivary pH is expected.

Study Outcome Measures

The first result will be the time it takes for the salivary pH to be restored after having been decreased by kissing with a person who has not consumed any beverage. To determine this, saliva pH will be measured every 5 min with a calibrated pH meter.

The second result will be the time it takes for the pH to be restored after two people kiss; however, this time, both people drink a drink that lowers the pH.

Finally, the average salivary pH of each group will be compared for each measurement with an interval of 5 min.

Data Analysis

Statistical analysis will be performed using the SPSS Statistics software (version 21.0; IBM SPSS Statistics). The data will be presented as descriptive statistics and examined for missing values, outliers, normality, and homogeneity.

To compare the descriptive variables of the groups, the t-test will be used for quantitative variables, and the chi-square test for qualitative variables. Kolmogorov-Smirnov and Levene tests will be performed to check the normality and homogeneity of the quantitative variables, especially the saliva pH measurements. Comparisons of salivary pH means between groups will be carried out with ANOVA in case of normality of the variables and, when normality does not exist, Kruskal–Wallis. In addition, the mean change in salivary pH will be compared between participants in the same group using a dependent sample analysis.

Results

The call for participants phase was opened in July 2024, and as of July 20, there is a record of 30 couples interested in participating. It is expected to end the call on August 30, 2024, and complete the study in November 2024.

The objective of this study's objective is to investigate the impact of kissing on salivary pH and its potential function in preventing dental caries. The findings of this study will provide valuable insights into the relationship between kissing and oral health. Previous research has suggested that salivary pH can affect the development of dental caries, but the role of kissing in this process has not been extensively studied. This study is crucial because it could lead to a better understanding of the factors that contribute to oral health and prevention of dental caries. The results of this study will be compared with those of previous research on the relationship between salivary pH and dental caries. The findings of this study may contradict existing beliefs regarding the role of kissing in oral health. The study will be supported by relevant literature and data on saliva pH and dental caries. This study will contribute to the field of oral health research and provides valuable information for the development of preventive measures against dental caries. The results of this study could have implications for the development of new strategies to prevent dental caries.

Discussion

In the context of these studies, no direct investigation has been conducted on the impact of kissing on salivary pH and its potential as a protective factor against dental caries. The literature does not directly address the impact of kissing on saliva pH and its potential protective effects against tooth decay. However, saliva is known to play a crucial role in oral health, and its physicochemical properties, including pH, are significant factors in the prevention of dental caries (9). Saliva acts as a buffer, maintaining pH levels that are less conducive to enamel demineralization, which is a key process in the development of caries (10). Interestingly, the salivary microbiome, which could be

influenced by intimate behaviors, such as kissing, is known to change with age and is more similar within families than between families (11). This suggests that the exchange of saliva through kissing could alter the salivary microbiome of the individuals involved, possibly affecting the oral environment. However, the literature does not provide evidence of a direct correlation between the salivary microbiome and dental decay (11), nor does it discuss the specific effects of kissing on salivary pH levels. In summary, while the protective function of saliva against dental caries is well documented, the specific impact of kissing on salivary pH and its subsequent effect on tooth decay prevention has not been elucidated in the provided papers. Further research is required to explore this relationship and determine whether the intimate exchange of saliva during kissing has a significant impact on the oral health of individuals. Additional studies should be conducted to investigate this connection and establish whether the transmission of saliva through kissing plays a crucial role in the maintenance of good oral health.

Limitations

This study may have limitations in terms of the sample size and generalizability. This study will add to the existing body of knowledge regarding the relationship between kissing and oral health.

Comparison with Prior Work

The consumption of sugary or fermented drinks and their impact on saliva pH has been explored in several studies. Kristanto et al. (2023) specifically investigates the effect of consuming original yogurt, which contains probiotic bacteria, on changes in saliva pH in the oral cavity. The study concludes that original yogurt consumption positively impacts salivary pH, suggesting a potential role in caries prevention (12). Lin et al. (2021) examines the association between sugary drink consumption and the incidence of dental caries in permanent teeth among Taiwanese schoolchildren, implying that sugary drinks can create an acidic environment conducive to caries development (13). Interestingly, while these studies focus on the direct impact of such beverages on oral health, other research has explored related health effects. For instance, Guérin et al. (2023) discusses how lactic fermented pineapple juice supplementation affects energetic metabolism in high-fat diet-fed mice, indicating that fermented juice is less detrimental to blood carbohydrate regulation than other sugary drinks (14). This suggests a potential difference in the impact of fermented versus non-fermented sugary drinks on metabolic health, which could indirectly influence oral health through changes in saliva composition and pH. In summary, research has shown that the consumption of sugary drinks can lead to a decrease in saliva pH, which is associated with an increased risk of dental caries ("Kristanto et al. Therefore, it is essential to consider the effects of fermented versus non-fermented sugary drinks on metabolic health, as this may provide valuable insights into their potential impact on oral health through changes in saliva composition and pH. (13,14). Conversely, the consumption of certain fermented products like original yogurt may have a beneficial effect on saliva pH and oral health(12). Moreover, studies have shown that these fermented products can also improve gut microbiota composition and enhance the immune system, further supporting their positive impact on overall health. Further research could elucidate the specific mechanisms by which fermented and non-fermented sugary drinks differentially affect saliva pH and overall oral health.

Conclusions

This study will provide insights into the relationship between kissing, salivary pH, and oral health, potentially offering new strategies for dental caries prevention. The results may challenge existing

assumptions about the role of kissing in maintaining oral hygiene. Further research will be needed to confirm these findings.

Acknowledgements

Marcelo Armijos Briones participated as director of the research project. Andrea Bermúdez Velásquez as associate researcher and Mariuxi Aguila as research assistant. The entire project was financed by the Catholic University of Santiago de Guayaquil.
The authors wish to thank the Catholic University of Santiago de Guayaquil, especially Silvia Chang for her management at ISAIN.

Conflicts of Interest

The authors declare that they have no conflict of interest.

References

1. Vannier SA, Rosen NO, Mackinnon SP, Bergeron S. Maintaining Affection Despite Pain: Daily Associations Between Physical Affection and Sexual and Relationship Well-Being in Women with Genito-Pelvic Pain. Archives of Sexual Behavior 2016 46:7 [Internet]. 2016 Sep 12 [cited 2024 Jul 3];46(7):2021–31. Available from: https://link.springer.com/article/10.1007/s10508-016-0820-5

2. Karelina K, Devries AC. Modeling social influences on human health. Psychosom Med [Internet]. 2011 [cited 2024 Jul 3];73(1):67–74. Available from: https://journals.lww.com/psychosomaticmedicine/fulltext/2011/01000/modeling_social_influences_on_human_health.10.aspx

3. Floyd K, Boren JP, Hannawa AF, Hesse C, McEwan B, Veksler AE. Kissing in Marital and Cohabiting Relationships: Effects on Blood Lipids, Stress, and Relationship Satisfaction. West J Commun [Internet]. 2009 Apr [cited 2024 Jul 3];73(2):113–33. Available from: https://www.tandfonline.com/doi/abs/10.1080/10570310902856071

4. Moore EA, Kulibert D, Thompson AE. Is a Kiss Just a Kiss?: Predicting Variations in Motives for Romantic Kissing. J Relatsh Res [Internet]. 2017 [cited 2024 Jul 3];8:e3. Available from: https://www.cambridge.org/core/journals/journal-of-relationships-research/article/abs/is-a-kiss-just-a-kiss-predicting-variations-in-motives-for-romantic-kissing/9BE16E0027E217B97C04051643D23051

5. Wasnik S, Hundekari J, Mittal R, Kot LS. Evaluation of stress score and correlation of stress score with heart rate, blood pressure and serum cortisol levels among health care workers in DCH and DCHC hospitals during Covid-19 duty. Medical Journal of Dr DY Patil Vidyapeeth [Internet]. 2022 Nov 1 [cited 2024 Jul 3];15(8):306–10. Available from: https://journals.lww.com/mjdy/fulltext/2022/15002/evaluation_of_stress_score_and_correlation_of.27.aspx

6. Moher D, Hopewell S, Schulz KF, Montori V, Gøtzsche PC, Devereaux PJ, et al. CONSORT 2010 Explanation and Elaboration: updated guidelines for reporting parallel group. BMJ [Internet]. 2010 [cited 2022 May 14];340:869. Available from: www.consort-statement.org.

7. Clancy J, McVicar A. Short-term regulation of acid-base homeostasis of body fluids. https://doi.org/1012968/bjon2007161627082 [Internet]. 2013 Sep 27 [cited 2024 Jul 4];16(16):1016–21. Available from: https://www.magonlinelibrary.com/doi/10.12968/bjon.2007.16.16.27082

8. Carlson GP, Bruss M. Chapter 17 - Fluid, Electrolyte, and Acid-Base Balance. In: Kaneko JJ, Harvey JW, Bruss ML, editors. Clinical Biochemistry of Domestic Animals (Sixth Edition) [Internet]. San Diego: Academic Press; 2008. p. 529–59. Available from: https://www.sciencedirect.com/science/article/pii/B9780123704917000179

9. AL-Zahawi SM. The association between some salivary factors and dental caries in group of school children and adolescents in Erbil city. Zanco Journal of Medical Sciences (Zanco J Med Sci) [Internet]. 2011 Aug 1 [cited 2024 Aug 7];15(2):64–70. Available from: https://zjms.hmu.edu.krd/index.php/zjms/article/view/447

10. Rusu LC, Roi A, Roi CI, Tigmeanu CV, Ardelean LC. The Influence of Salivary pH on the Prevalence of Dental Caries. In: Rusu LC, Ardelean LC, editors. Dental Caries [Internet]. Rijeka: IntechOpen; 2022. p. Ch. 3. Available from: https://doi.org/10.5772/intechopen.106154

11. Foxman B, Luo T, Srinivasan U, Ramadugu K, Wen A, Goldberg D, et al. The effects of family, dentition, and dental caries on the salivary microbiome. Ann Epidemiol [Internet]. 2016 May 1 [cited 2024 Aug 7];26(5):348–54. Available from: https://pubmed.ncbi.nlm.nih.gov/27157862/

12. Kristanto Y, Putri NAA, Sumaryono B, Kusumastuti E, Kristanto Y, Putri NAA, et al. Effect of consuming original yogurt on changes in saliva pH in the oral cavity. https://wjarr.com/sites/default/files/WJARR-2023-1465.pdf [Internet]. 2023 Jul 30 [cited 2024 Aug 8];19(1):1045–50. Available from: https://wjarr.com/content/effect-consuming-original-yogurt-changes-saliva-ph-oral-cavity

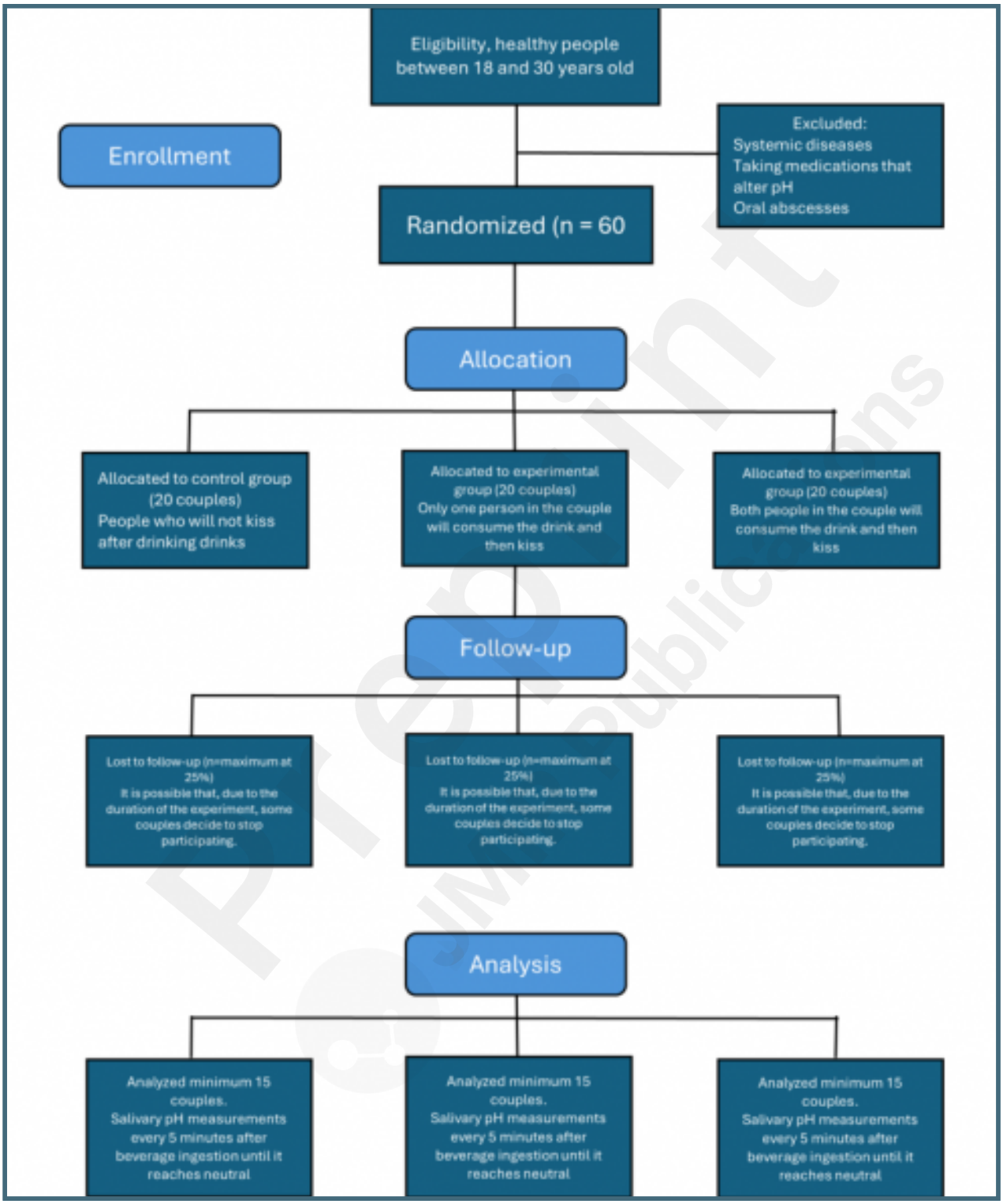
13. Lin PY, Lee YC, Hsu LY, Chang HJ, Chi LY. Association between sugary drinks consumption and dental caries incidence among Taiwanese schoolchildren with mixed dentition. Community Dent Oral Epidemiol [Internet]. 2022 Oct 1 [cited 2024 Aug 8];50(5):384–90. Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/cdoe.12683

14. Guérin M, Remize F, Bringart M, Planesse C, Rondeau P, Robert-Da Silva C, et al. Fermented Pineapple Juice Consumption Limits Metabolic Disorders Associated to Sugary Drinks on High-Fat Diet-Fed Mice. Mol Nutr Food Res [Internet]. 2023 Jun 1 [cited 2024 Aug 8];67(11):2200670. Available from: https://onlinelibrary.wiley.com/doi/full/10.1002/mnfr.202200670

Supplementary Files

Figures

Study flowchart. Selection and randomization of couples participating in the study. In total, 45 couples will be required to try 3 different drinks.



Multimedia Appendixes

Ethics committee approval.
URL: http://asset.jmir.pub/assets/eff5681c6eceb6e1937a1ce3721b3466.pdf

Clinical trial register.
URL: http://asset.jmir.pub/assets/c47bce8d71258c1a1eec29999d51e606.pdf